Bay Area
Freeway Concept of Operations

Strategic Plan

Deliverable No. 15

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1. INTRODUCTION

The California Highway Patrol (CHP), Metropolitan Transportation Commission (MTC) and the California Department of Transportation (Caltrans) District 4 have undertaken a Freeway Concept of Operations Study for the San Francisco Bay region. The purpose of the study is to identify strategies to effectively manage recurring traffic congestion, incident response, traveler information and corridor management on freeways in the Bay Area.

The goal of the Bay Area Freeway Concept of Operations project is to improve freeway operations policies, procedures, and practices, and build consensus on the roles, responsibilities, and resource needs for freeway operations. Freeway operations are the activities that directly affect the safety, travel time, travel route selection, time of travel, or mode of travel, of travelers using or planning to use the freeway network. Phase 1 of the Concept of Operations project will result in a Freeway Operations Strategic Plan Report that recommends the future direction for freeway operations in the Bay Area, and an Action Plan that will guide future work on the Freeway Concept of Operations.

Based on the key findings and conclusions in the earlier tasks, the Strategic Plan, presented in this document, includes strategies that are recommended to address the needed policies and procedures and the institutional and technical issues regarding freeway operations in the Bay Area. The freeway operations strategies address the key institutional and technical issues, including modifications to the roles, responsibilities and resources for freeway operations.

2. STRATEGIES

Strategies for the Bay Area Freeway Concept of Operations have been grouped into four categories as shown in the list below. These categories represent logical groupings of related strategies that fit within the context of regional planning, operational procedures, operational policies, and organizational issues. These strategies are numbered only for reference purposes, and the numbering does not indicate any priority. Each strategy description includes an issue or need statement, a recommended strategy and approach, and benefits to implementing the strategy.

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2.1 Planning

1. Develop Regional Strategic Plan for System Implementation and Integration

Issue: There is a need for an overall strategic plan to migrate from the existing regional system, which consists of several independent system components, into a regional integrated system. The Bay Area Freeway Concept of Operations Strategic Plan focuses on key strategies aimed at improving interagency communication, operations and long-term planning for freeway operations. A Strategic Plan for System Implementation and Integration will outline specific deployment recommendations, integration requirements, phasing, timing, funding, operations and maintenance and other requirements to implement and integrate specific system components of the freeway operations system.

Strategy/Approach: The plan should provide a blueprint for how traffic and incident data will be collected, integrated and distributed by the three agencies. The plan also should address how to integrate probe data (TravInfo®, FSP), detector data from TOS, and incident data from CHP CAD and call boxes and disseminate this information to regional and local agencies, as well as to the public. Communications issues such as how to transmit data from TMC to other TMCs will need to be addressed. The plan should include a schedule for system implementation and integration and sources of funding.

Caltrans is in the process of updating their TOS/TMC Implementation Plan. This plan will encompass all aspects of the TOS including field elements, communications systems and the TMC, as well as funding requirements and phasing. This plan is necessary to provide the foundation for Caltrans' portion of the Regional Strategic Implementation and Integration Plan. Local agencies are asking for more information regarding the current status and next steps of planned freeway management programs. In particular, they want to know the implementation schedules and status of funding for bringing Caltrans existing TOS and TMC on-line so that they can plan implementation of their systems accordingly. They indicated that it would be helpful if there were some standardized way of receiving this information. The partnership or other regional forum should be used to develop and guide implementation of the regional strategic plan for freeway operations.

Benefits: A Regional Strategic Implementation and Integration Plan will provide guidance for regional and local agencies in the Bay Area regarding operation and maintenance, upgrading, phasing/timing, and future investment in the regional freeway operations systems. Local agencies have plans for what they need and want to do in their jurisdictions, and it will be important for their plans to coordinate with the regional efforts. Likewise, the Regional Strategic Implementation and Integration Plan needs to consider planned deployments of the local agencies. The three regional agencies, the Smart Corridor

programs, and representatives from the local agencies should work together in the development of the plan. The planning effort should address a number of important issues including system functionality, operations and maintenance, center-to-center communications and integration, TMC requirements and upgrades, funding and scheduling.

A key element of this Regional Strategic Implementation and Integration Plan will be the consensus building among the regional and local partners in the Bay Area. Sustaining current operations, and implementing systems that meet the region's needs, requires continued coordination and support for the program on behalf of the involved agencies.

2. Develop Regional Evacuation Management Plans

Issue: Increased focus on security at the national and local levels has prompted many agencies across the country to proactively begin planning for coordinated responses to disasters and large-scale emergency situations. Agencies in the Bay Area already have plans in place for earthquake response and other emergency situations, and Caltrans and CHP are developing traffic management plans in the event that one or more of the Bay bridges is lost. These plans need to be expanded to include the full range of emergency and transportation agencies in the region to identify how the Bay Area freeway system should be utilized in the event of a major disaster or evacuation situation.

Strategy/Approach: Transportation systems are a significant and vital part of a regional infrastructure, and need to be a critical component of any regional evacuation management program. It is recommended that a task force be established consisting of Caltrans, CHP, MTC, state and County Emergency Management Agencies, Fire, EMS, the military, transit agencies, Airport representatives, local police, county and local public works/transportation agencies, hospitals, and others that would have a role in emergency evacuation scenarios. The purpose of this task force will be to spearhead the regional evacuation plan development, as well as identify other agencies and entities in the Bay Area and nearby regions that would need to play a vital part in such an endeavor.

This task force should examine potential evacuation situations, and how the transportation system could be utilized in the event of a major disaster. For example, mass evacuations could necessitate reverse flow on all freeways to allow for one-way travel, or could require that shoulders be used as an additional lane. In the event of a large-scale emergency at one of the airports, freeway closures and one-way traffic for emergency vehicles from the airport to the nearest emergency rooms could be established. How best to utilize the surface transportation systems, as well as the ITS infrastructure that is in place for the TOS, should be thoroughly discussed and strategies developed. These strategies may need to be extended to major arterials in order to establish a broader evacuation scenario.

Benefits: Evacuation management workshops would serve as an excellent forum to get agencies together to focus on this important issue, potential "strawman" evacuation scenarios, potential roles and responsibilities, and evaluate what resources (infrastructure, personnel, funding and other needs) would be required to carry out the scenarios. The results of this effort should be incorporated into the incident management training program recommended as part of the Interagency Capacity Building Program strategy.

Expanding the Bay Area's existing emergency traffic management plans to include large-scale evacuation plans is a critical step toward increased preparedness in the region. As a high-profile region of the country, the Bay Area could be eligible for federal funding to support this kind of planning activity. One of the objectives of the task force should be to

seek out opportunities under new Security Funding Programs established by the federal government.

3. Develop Regional ITS Architecture

Issue: A comprehensive regional ITS Architecture helps to ensure compatibility between subsystems and sharing of data between appropriate institutions. The architecture development process helps identify opportunities for integration and where standards are needed. The process also helps identify where interagency agreements may be necessary to overcome institutional barriers.

Strategy/Approach: As part of the Freeway Concept of Operations project, an ITS Architecture for Freeway Operations was developed, and is discussed in more detail in a separate deliverable. The Freeway Operations architecture is aimed specifically at components and agencies involved in Freeway Operations, and provides a roadmap for deployment and integration of major subsystems that are needed or utilized as a part of Bay Area freeway operations. This architecture, developed using TurboArchitecture, should be reviewed on an annual or biannual basis to update the database with new infrastructure and deployments, new goals, and additional integration activities. This way, the most current "state of the system" will be reflected in the architecture, and agencies will be able to review what additional steps need to be taken to achieve the desired level of operations, interoperability, and system integration.

The development of a regional ITS architecture is already underway. MTC is leading the effort to develop a comprehensive regional ITS Architecture for the Bay Area that will follow the National ITS Architecture model. The ITS Architecture for Freeway Operations developed as part of the Concept of Operations (discussed in a separate deliverable) will be included with the regional ITS architecture. It is important that these two efforts (the freeway architecture and the regional ITS architecture) are coordinated.

Benefits: In addition to providing a roadmap for system deployment and integration, a regional ITS architecture (developed using the guidelines in the National ITS Architecture) is a primary requirement for federal ITS funding. As part of FHWA's Final Rule for applying the National ITS Architecture at the Regional Level (January 8, 2001), funding for ITS projects will require that a regional ITS architecture be developed by April 8, 2005. By having a regional architecture in place, as well as conforming to applicable standards per FHWA's rule, the Bay Area will ensure that it will meet the requirements to receive ITS project funding from the Highway Trust Fund.

2.2 Freeway Operations Infrastructure

4. Integrate Incident Detection

Issue: Freeway incident detection and identification systems operated by the various agencies in the Bay Area need to be better integrated. The Regional TMC uses incident detection algorithms that process loop detector and RTMS data to identify potential incidents. TravInfo® relies on incident reports coming into the TMC, incidents reported by CHP through their CAD system, (these incidents include those reported through the call boxes, freeway service patrols, 911), and other sources. Emergency calls come in through a variety of sources, depending on whether it's a landline or wireless call. Landline 911 calls go directly to the respective jurisdiction for response and local agencies can forward the call to the appropriate agency (such as to the CHP dispatch center if it is a freeway traffic-

related emergency). All cell phone 911 calls are directed into the CHP dispatch center, and it is CHP's responsibility to determine the location and nature of the emergency and forward the call to another jurisdiction or entity if appropriate. Call box calls go through the call box answering center (run by a contracted, private company), and 60% of those calls are routed to CHP.

With all of these different reporting methodologies and different sources for incoming incident information, the incident data is in multiple reports and not as useful as it would be if it was all in one incident management information system.

Strategy/Approach: Incident data needs to be collected, assimilated and distributed by the three agencies in an integrated manner. The data used for incident management needs to be assimilated in such a way that it appears to have all come from the same source, and be in a consistent format that will serve needs of all three regional agencies, as well as local, County, and private EMS providers. For instance, the MTC will use it for traveler information while Caltrans and CHP will use it for real-time incident response and management. The system needs to meet these multi-jurisdictional requirements. Also, the system needs to have a process of integrating the data coming from different sources including FSP, detector data from TOS, and incident data from CHP CAD and call boxes. There currently is not a function in the TMC software that would permit integrating and cross-checking of incident data. A GIS-based system could be developed that could be used to compile and track incident reports from various sources, and provide a cross-checking mechanism to verify incident information. This strategy should be carried out in concert with the development of the TravInfo® system and the upgrade to CHP's CAD system. CHP's CAD system could be structured to integrate and crosscheck the 911 calls, FSP reports, and call box reports. TravInfo® could then integrate the CHP CAD data with the TOS detector data and crosscheck the two sources.

Benefits: Integrating incident detection functions of the various agencies and streamlining incident information into a consistent format for use by multiple entities will provide several regional benefits. It will enable a foundation for consistent incident management procedures, provide access to valuable incident location and severity information by multiple agencies, and provide for more comprehensive and accurate regional incident information.

5. Develop and Implement an Enhanced and Integrated CHP CAD System

Issue: The CHP CAD system is required to perform many tasks that it wasn't originally designed to do. Besides just serving CHP, the CAD also interfaces with a number of other freeway operations systems including the call box answering center, FSP computer, TravInfo® and the TMC. These interfaces need to be automated in order to improve freeway management efficiency, but automating these interfaces will require a major upgrade of the CAD system. Also, the current CHP CAD system is not able to provide useful log data on location of incidents, which could be used by MTC for planning call box redeployment or better utilization of existing call boxes as incident notification devices.

Strategy/Approach: Thus, it is recommended that a new CHP CAD be developed and implemented with these requirements in mind. As a state agency, CHP will need to investigate the feasibility of such an upgrade on a statewide level. This also would require a statewide process to define the functional requirements for a new CAD system with standard center-to-center interfaces.

The upgraded CHP CAD system should be integrated with several other regional systems (TMC, TravInfo®, FSP computer, call box center, and potentially Smart Corridors), and it will be important to ensure that the new CAD system and its supporting communications infrastructure are fully operational. The implementation of an equipment monitoring system for the CAD system is recommended to diagnose and respond to system problems early to avoid system failures. This will reduce the burden on staff responsible for maintenance of the CAD and will help ensure that the system remains operational.

Benefits: CHP is a key agency involved in freeway operations, and as the lead agency for incident management functions, it is important that the dispatch and communications functions are as automated, accurate and regionally integrated as possible. By upgrading CHP's CAD system, it will automate several of the necessary interfaces with other regional and local agencies and allow for improved reporting and data management. These are two critical functions that will support improved coordination and operations of the freeway system in the Bay Area.

6. Provide Common Radio Frequency for Emergency Responders

Issue: Currently, the various emergency response agencies operate their radios on their own frequencies. With different frequencies it is cumbersome to communicate with each other through their dispatch centers.

Strategy/Approach: The Bay Area needs to enable a common communications system for emergency responders and promote its availability. The use of a common radio frequency is desirable when responding to incidents to allow fire and police Departments, CHP, and EMS units to all communicate on the same frequency when responding to an incident on the freeway. It may also be useful for Caltrans Maintenance, the Caltrans Traffic Management Team, FSP, and the County Coroner to have access to this radio frequency.

There are some radio frequencies that are available for mutual aid by Bay Area agencies such as California Law Enforcement Radio System (CLERS), California Law Enforcement Mutual Aid Radio System (CLEMARS) and CALCORD. With the increased national focus on emergency management issues, there could be opportunities for federal grants or other federal financial support to showcase the Bay Area as a model deployment for this type of regional emergency management coordination. An incident management team comprised of representatives from emergency response agencies in the Bay Area should be formed and tasked with seeking out federal funding opportunities to implement such a program.

Benefits: A common frequency for emergency responders will ensure that there is dedicated communications for incident and emergency management. This radio frequency, which should be utilized by public and private emergency responders, will provide for enhanced communication among dispatch centers as well as for communications between dispatch and personnel/vehicles in the field during critical situations.

7. Establish and Maintain a Sustainable Communications System for Freeway Operations

Issue: The TOS, for the most part, uses leased communication systems that do not provide the reliability, bandwidth, and functionality necessary for a freeway management system of the Bay Area's magnitude. TravInfo® and the Smart Corridors are deploying communication systems, many of them on or adjacent to freeway segments, and Caltrans has the use of four fibers in the BART fiber optic communications system. There are a number of challenges in effective data and video exchange between the Regional TMC and

local TMCs because of legacy systems, and lack of adequate communications infrastructure to support the desired level of system functionality.

Strategy/Approach: Planning for a communications network for freeway operations is already underway. A Communications Master Plan is being developed that will provide alternatives and recommendations for maximizing the use of the existing and planned communications systems, network strategies, infrastructure, and interconnections (center-to-center and center-to-field). A Communications Implementation Plan, with cost and phasing recommendations, also is being prepared. Because this is a regional network, the cost to implement and maintain it will need to be leveraged among the various agencies in the Bay Area. Furthermore, the total system will likely not be funded all at once, so strategies for implementing the communications system in stages should be considered. Once designed, there will need to be a commitment on the part of local and regional agencies to implement, operate and maintain this regional resource.

Benefits: This communications network will provide a foundation for enhanced regional operations, communication, and information (data and video) exchange among Bay Area agencies involved in freeway operations. By implementing the right mix of communications infrastructure to support the needed center-to-field and center-to-center requirements, the network can be built-out in phases to address existing needs, and in a manner that is expandable to accommodate future expansion and additional communications needs.

8. Caltrans TOS/TMC Enhancement and Completion

Issue: Enhancements and completion of the TOS and TMC will require a comprehensive program that considers future resources, phasing, integration requirements, interfaces and technology evolution.

Strategy/Approach:

Enhancing the TMC Software – As the TMC adds functionality and becomes interconnected with more systems, the software it uses will need to be enhanced or replaced. Any enhancements to the TMC software should meet the needs of the Bay Area and be consistent with the Caltrans Headquarters TMC Master Plan for the TMC software and the TMS Master Plan currently under development.

A plan for enhancing the TMC software will be included as part of the TOS Implementation Plan currently under development by Caltrans. Part of the strategy for TMC software enhancement should include considerations for the legacy systems, which should remain operational as the TMC is migrated to its enhanced architecture. Additionally, there needs to be an integrated approach to data archiving and retrieval, an automated interface with the CHP CAD system, and provisions for integrating future data sources such as TravInfo® probe data and Smart Corridor data.

Upgrade and Replace TOS/TMC Infrastructure – Many of Caltrans' existing ITS field elements need to be upgraded with newer technology to improve system functionality and reliability, and to reduce the number of legacy systems. Upgrading these systems and components to more current technology also will allow Caltrans to incorporate standards that have been approved, such as NTCIP.

Caltrans should identify, prioritize and replace or upgrade non-functional TOS/TMC components. This strategy should build on other recommended strategies by using the results of the needs analysis and real-time information from the equipment monitoring

system to identify which components need to be replaced. In the future, as outdated TOS/TMC components become non-functional, they should be upgraded or replaced.

Upgrades to legacy systems will simplify maintenance training and spare parts inventories. Furthermore, as new standards become approved and adopted, compliance of legacy equipment and systems with these new standards will become an issue. Upgrading and/or replacing also will ensure that the system remains functional and operational, and that the equipment is in proper working order.

Implement a TOS/TMC Equipment Monitoring System – An equipment monitoring system is needed to detect when TOS/TMC components are in need of maintenance. An automated equipment monitoring system could alert Caltrans of specific malfunctions and maintenance needs. This system also should have a database and be capable of tracking maintenance activity on a per-device or per-system basis, and be able to help "predict" future maintenance needs and requirements.

It is recommended that equipment monitoring systems be researched for their applicability to the TOS/TMC, as well as for performance and reliability of such systems in other areas. A research partnership with PATH could facilitate this endeavor.

Complete TOS to Include Remaining Freeway Miles in Bay Area – Once the improvements and planned near-term TOS activities (as outlined in Caltrans' 2002 TOS Implementation Plan) are complete, it will be important to develop a phased approach to completing the TOS to include additional freeway miles in the Bay Area. This will require identifying which freeway segments should be instrumented and a build-out phasing plan, additional infrastructure, additional enhancements to the TMC software, and continued coordination with local agencies for integration. Caltrans and the other regional agencies will need to gain the concurrence and support of local agencies in order to secure the funding and cooperation necessary to implement completion of the TOS.

Benefits: Upgrading and enhancing the TOS is a vital element to the overall freeway management program in the Bay Area. Once the existing TOS is brought to full functionality, and benefits are demonstrated, the TOS should be completed for the remaining freeway mileage. This strategy represents a group of strategies that, combined, provide a phased approach to upgrading, enhancing, completion and operations of the system to optimal functionality. Other strategies that are not necessarily exclusive to the TOS/TMC (including Staffing and Funding Program, Operation and Maintenance, Integrated Incident Detection, and Ramp Meter Policy Feasibility) will need to be considered as part of the overall TOS Completion Program. With the TOS performing satisfactorily, the operations of the freeway network will be improved by more rapid detection of incidents and quicker response to clear the freeway and restore it to normal operation.

9. Develop and Implement an Enhanced and Integrated TravInfo® System

Issue: MTC will be upgrading TravInfo® over the next four to six years to include its own data collection system, integration of data from others, and data dissemination devices including a dial-in phone line, a web server interface, and kiosks.

Strategy/Approach: This strategy is already underway. It will be important that the updated TravInfo® system be developed with NTCIP-compliant interfaces so that the system will be compatible with the TMC, CHP CAD and other regional systems. It is also important that this system serves the needs of the regional and local agencies in the Bay Area. The data collected by TravInfo® should be distributed in a useable format to CHP, Caltrans, and local

agencies so that it can be used for incident and traffic management as well as traveler information.

Benefits: TravInfo® as a data collector, consolidator, and disseminator will serve as an important source for freeway and multimodal traveler information in the Bay Area – for travelers as well as for agencies in the region. Integrating TravInfo® with the other regional and local agencies will ensure that this information is accurate and comprehensive on a regional level. TravInfo® also will be able to provide valuable volume and incident data to the other agencies to improve traffic and incident management on Bay Area freeways. This information can also be shared with the public via private partner services.

2.3 Operational Policies and Procedures

10. Develop Overall Data and Video Sharing Policy

Issue: There is a need for a policy that defines how video and other real time data are shared among Caltrans, MTC, CHP, Smart Corridor programs, local transportation agencies, and with the media and the public. This data includes real-time traffic data, live CCTV images, incidents, closures, and advisories collected by the agencies. TravInfo® and Caltrans can improve their services to the public by getting a direct data stream of freeway incidents from CHP's CAD.

Strategy/Approach: An overall data and video sharing policy needs to be developed to maximize the use of the numerous data that are being obtained through the various systems that have been implemented in the Bay Area, and those that will be implemented in the future. The policy should also cover messages that are disseminated over various agencies' highway advisory radios (HAR) and dynamic message signs. In addition, the policy needs to address how costs associated with data sharing will be handled. CHP and TravInfo® are currently preparing an agreement to permit sharing of data. Similarly, there needs to be a policy for sharing Caltrans real-time speed data with other agencies. Any data sharing policy that is developed that involves state agencies (Caltrans and CHP) will have to be consistent with statewide policies and procedures. Conversely, the current work on the TMS Master Plan provides an opportunity for the Bay Area to influence statewide policies and procedures. This policy needs to address data sharing from agency-to-agency, agency-to-media, and agency-to-public.

From a technical standpoint, the data and video sharing policy needs to outline specific parameters and standards that are applicable for sharing data from center to center. Data sharing, on a regional level, also should consider what needs to be in place (such as a firewall, XML feed, and other support infrastructure) to allow access to Bay Area data by the private sector, such as the media, information service providers, and other private companies. Private sector data access will likely be addressed through TravInfo® agreements with its private partners, and other agencies that intend to share data with the private sector could use the TravInfo® approach to ensure consistency. Sharing of information with the public could largely be addressed by the media or TravInfo® private partners; however, public agency-owned systems (such as Internet, phone, or field devices) need to be considered as part of this policy. Standards applicable for ATIS data and video sharing should be included as part of this policy.

It also will be necessary to develop and implement institutional policies that will facilitate information exchange among agencies in the Bay Area. Institutional policies should address terms of use for data, usage guidelines, restrictions on use, data security, archiving, and

other parameters. A Memorandum of Agreement (MOA) or other written policy signed by Bay Area agencies should be developed to define the agency roles, responsibilities, and outline the policies for exchanging data and video. The MOA should clearly state that data being obtained from partner agencies is being used, uses of the data that is being obtained, and with whom it is being shared.

Benefits: By developing specific guidelines and policies for data and video exchange, Bay Area agencies will have a formal process to facilitate timely exchange of information. Policies will be in place governing usage and any restrictions on use, and the agreed-upon parameters will ensure that the data being exchanged is of a standard format, quality and detail level. These parameters are significant when dealing with multiple data types and sources.

11. Investigate a Corridor-based Ramp Metering Policy in the Bay Area

Issue: The current approach to a ramp metering policy is to adapt the Caltrans policy to local agencies' needs. Caltrans generally wants to maximize corridor operations, and local agencies typically are concerned that ramp metering will restrict their access to the freeway and interfere with local traffic flow, while providing a benefit to longer distance commuters already on the freeway. The lack of an accepted policy to address ramp meter operations and regional equity issues makes it difficult to implement ramp metering in the Bay Area.

Additionally, some of the local agencies have indicated the need for policies regarding the coordination of ramp meters with nearby traffic signals on arterials. Some cities have Letters of Understanding to permit Caltrans to operate the traffic signal at the freeway ramp terminal and the next nearest signal. Not all cities have such agreements with Caltrans in place and some lack coordination between ramp intersection signals and adjacent city signals, thus inhibiting smooth traffic flow on city streets.

Strategy/Approach: A feasibility study needs to be conducted to identify whether a region-wide, corridor-based ramp metering policy among Caltrans and local agencies could address issues specific to each corridor while ensuring equity across corridors and agencies. Caltrans needs to work with local agencies to investigate the feasibility of a region-wide ramp metering policy in the Bay Area consistent with statewide policy. This will require obtaining consensus on the benefits of ramp metering, potential operational strategies and scenarios, and the roles of local and regional agencies in the effective implementation of a consistent ramp metering policy. This effort will need to look at whether or not there is a need for a formal ramp metering policy, and if an across-the-board ramp metering policy can effectively be implemented for Bay Area freeways considering the different agency needs and concerns.

Benefits: The benefit to this feasibility study will be increased dialogue among Caltrans and local agencies regarding current ramp meter operations and issues, and increased coordination to approach ramp metering on a multi-agency, regional level.

12. Improve Response and Clearance Time for Incidents

Issue: Several agencies in the Bay Area respond to incidents on freeways. Response and clearance times for incidents and fatal collisions could be improved through a combination of strategies, including increased interagency coordination, streamlined communications, and policy implementation. Current legislation and agency authority need to be evaluated to identify what current processes and procedures could be improved or revised so that response and management of incidents on freeways are more effective.

Strategy/Approach: Effective incident response requires the coordinated efforts of CHP, Caltrans, EMS, County Coroner, FSP, local agencies, contracted support services, and others. CHP is typically a first-responder to freeway collisions. CHP has defined policies and procedures for incident command on-scene, including setting traffic control, road flares, and requesting emergency and towing services (if they already have not been notified by CHP dispatch). If the incident is likely to cause traffic to divert onto city streets, CHP also notifies local agencies of the incident and likely duration. When fire, emergency, and other response crews are dispatched to a freeway incident scene, CHP generally helps to identify the fastest response route depending on the level of traffic congestion. On-scene officers also direct traffic including arriving emergency response and towing vehicles.

Fatal collisions also require the services of the County Coroner. The law prohibits moving a deceased person until the Coroner's investigation has been completed; however, current legislation with regard to Coroner response hinders faster arrival times by the Coroner. The California Vehicle Code prohibits a Coroner from driving an emergency vehicle to the location of a fatal collision – without a siren and emergency lights, the Coroner could take an hour or two to reach the scene. Coroners commonly request a CHP escort if there is severe congestion, but CHP usually does not have staff available to act as an escort. This delay in getting the Coroner to the collision scene can significantly affect the severity and duration of the congestion following a fatal collision.

Measures to improve response and clearance time of incidents and fatal collisions will require a combination of strategies, some of which are outlined as separate strategies in this deliverable:

- First, improving incident detection by integrating incident detection, identification, and verification systems will provide more accurate, detailed, and specific information about incident locations, severity levels, and impacts on the freeways. Ensuring that this integrated and accurate information is available to CHP, Caltrans, FSP, and private ambulance companies should be a top priority. This information also needs to be provided to travelers, via TravInfo®, media, and through agency-owned devices.
- Effective coordination among the incident responders (public and private), including a common radio frequency for emergency responders, will reduce the time to get to the scene, streamline procedures when on-scene (i.e., parking, incident command), and as a result, reduce the overall time to reach and clear the incident.
- Revising the vehicle code policies regarding sirens and flashing lights on Coroner's vehicles, providing for mandatory CHP escorts to fatal freeway collisions, as well as improving communication between CHP and the County Coroner would greatly reduce the time it takes for the Coroner to arrive to the scene. Improving Coroner response time would greatly contribute to the time it takes to clear the incident scene and restore the freeway lanes back to full operation. Any changes to Coroner policies would require legislative coordination and action.
- More coordination is needed with the private ambulance companies that service the Bay Area. These companies often service multiple counties and deal with several jurisdictional policies related to incident management. Although many of these policies are similar, EMS representatives interviewed indicated that each county had its own emergency service protocols. Private ambulance companies should be involved, to the extent practical and feasible, in the process for building a more coordinated multi-jurisdictional freeway incident management program in the Bay Area.

Benefits: The benefit of these strategies will be a more coordinated effort to respond and clear incidents and fatal collisions on the Bay Area freeways, which will help to restore capacity after an incident as well as reduce the potential of secondary collisions.

2.4 Organization, Staffing and Funding

13. Establish Maintenance Program for Freeway Operations

Issue: In order to bring the existing system to complete functionality, agencies should establish a sustainable operations and maintenance (O&M) program for freeway operations in the Bay Area.

Strategy/Approach: This analysis will involve producing and maintaining an accurate inventory of all system elements (including type and number of devices, life cycle, performance history, and warranty information), and providing performance-monitoring mechanisms for field devices, communications systems and other components that are part of the various programs that comprise the Bay Area freeway system. These include the TOS and TMC, TravInfo®, FSP, call boxes, and CLEAR. Once a needs assessment has been done, Caltrans, MTC and local agencies (if applicable) can define program activities. Some of the maintenance activities might include scheduled preventive maintenance, responsive maintenance, and staff training programs. As part of the program development, agencies might want to identify if contracted operations would be feasible for specific devices or systems.

Benefits: An established O&M program will provide many benefits to agencies in the Bay Area. First, it will provide a comprehensive set of maintenance guidelines, needs, requirements, processes and element-specific maintenance information. Second, this type of O&M program can be used to forecast staff and budget requirements, and identify any deficiencies. This will ensure that O&M needs can be more accurately budgeted and programmed and a balance is maintained between the size of the freeway operations system and the ability to operate and maintain it. Third, performance monitoring equipment as part of the O&M program will help to reduce the burden on staff and financial resources for some types of preventive or routine maintenance activities. Performance monitoring mechanisms can also be used as a "predictive" maintenance tool, whereby streamlining the maintenance need identification process based on the performance history of certain components of the field, communications or operations center equipment.

14. Establish Staffing and Funding Program

Issue: Agencies in the Bay Area need a staffing and funding program to ensure adequate resources are in place to support the level of regional freeway operations that is needed. This program is needed for current freeway operations as well as for TOS completion. This is a key issue with regard to Caltrans' TOS completion, ongoing TOS operations and maintenance (including the TMC), CHP and the new CAD system that is needed and MTC's ongoing operation of the Freeway Service Patrol, call boxes, and TravInfo®. There also are funding and staffing issues regarding operations by the local agencies.

Strategy/Approach: An action item needs to address a means to balance the long-term funding and staffing needed to support future regional freeway operations activities in the Bay Area. This program needs to look at what levels of staff and funding resources are needed to sustain current operations, and anticipated staffing and funding requirements for

planned and desired system completion and enhancements. A phased staffing and funding program should also consider O&M requirements (as outlined in the previous strategy).

Consideration should be given to realistic forecasts of future funding from federal funding sources, from some pooled funding mechanism, and from state funds. Contracting with a private company to provide some of the operations support and maintenance might enable funding to be used that would not be available to hire new employees.

The likelihood of obtaining additional funding for freeway operations, particularly on a regional level, will be improved if the system can be shown to have regional benefits that justify its costs. This will require identifying specific benefits and successes associated with the TOS/TMC deployment, with the FSP and call box program, with TravInfo® and with CHP's incident management program. A component of the staffing and funding program should include a performance-monitoring plan to demonstrate ongoing benefits of the investments being made in freeway operations.

Benefits: A staffing and funding program will ensure that these resources are primary considerations when looking at existing system operations and maintenance, as well as future system completion, and that they are factored in with capital costs for infrastructure as part of the overall programming processes. Any gaps between infrastructure requirements and available staff and funds to maintain and operate the infrastructure will be identified. This also will allow staffing and funding to be approached on a regional level, and perhaps identify some opportunities for resource sharing to continue to operate, maintain, integrate, and enhance systems for freeway operations. Examples of resource sharing could be agency agreements for infrastructure maintenance for freeway system and Smart Corridor field elements (such as CCTV or DMS), and agreements with private telecommunications companies to allow use of freeway right-of-way in exchange for a fiber optic cable to use for freeway operations.

15. Establish Ongoing Interagency Capacity Building

Issue: There is a need for coordinated training and professional capacity building among regional and local agencies involved in freeway operations in the Bay Area.

Strategy/Approach: The training and capacity building should focus on specific areas that are priorities for Bay Area freeway operations, which could initially include incident management, traveler information, and congestion management. As the program expands, additional areas for regional training and capacity building should be identified.

Training and capacity building for incident management was identified as a high priority for the incident management agencies and incident responders, and should be the first focus area for the interagency training effort. Incident management agencies/entities include CHP, fire departments, police departments, EMS units, Caltrans Maintenance, the Caltrans Traffic Management Team, FSP, and local transportation agencies.

Lack of coordinated training and clear jurisdictional authority delay response and exacerbate the traffic impacts of collisions, incidents, and events. Many fire departments indicated a need for training involving all agencies so everyone is trained the same. This training includes roles and responsibilities of the various responders, how traffic control will be established, route guidance, use of TOS and other ITS elements to assist with traffic control, and on-scene strategies (including where emergency vehicles should park, incident command, and others). Evacuation Management Plans, which are discussed as a separate strategy, also should be incorporated into the interagency incident management training. These training sessions should be provided for all the agencies responsible for freeway

incident management to provide consistent training to all involved and to increase awareness of the roles and responsibilities of the different agencies involved in incident response in the Bay Area.

Benefits: There is a substantial benefit to be realized by having coordinated training programs involving staff from the regional and local agencies. It will help to ensure that staff from different agencies are obtaining the same levels and types of information and training.